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ABSTRACT

After reviewing effective teaching research during the past 20 years, one basic question arises: do teachers make any difference? Specifically, do teachers' classroom practices have any effect on student outcomes beyond the effects of ability and home background? What knowledge of minimal teaching competencies has been gained, and how firm is the knowledge base? Attempting to address these issues, this paper reports the results of a year-long classroom observation study involving 75 second- and fifth-grade teachers. Outcome measures included reading and mathematics achievement, student self-concept and classroom social status, and classroom behavior ratings. Teacher perceptions were measured through Q-sort, questionnaires, and indepth interviews. The study focused on the "commonplaces" of teaching, including content coverage, time usage, student-task engagement, group and individual instruction, question-response sequences, and student discipline. Results suggest that achievement is maximized by the following classroom conditions: high emphasis on academic instruction and student engagement in academic tasks, whole class instruction, effective question-answer and seatwork practices, minimal disruptive behavior, and prompt feedback to students. While little relationship between teaching variables and student achievement can be proven, the above recommendations are low-cost and worth trying. (MLH)

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WHAT RESEARCH SAYS TO THE TEACHER:

CLASSROOM PROCESSES AND STUDENT OUTCOMES

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INTRODUCTION

In preparing for this session, I found myself indulging in the rather dangerous practice of reflecting upon my experiences over the years in professional development activities for teachers. This reflection led to a few rather disconcerting thoughts. First, it made me wonder whether someone who has not been a practicing teacher for many years, except in a university, which I suspect does not count in the minds of elementary and high school teachers, can be at all credible in talking about effective teaching. I have often used the argument that one who looks at classroom practices as a detached observer is capable of seeing important things which might be lost on the practitioner. However, I am not at all convinced that this argument has any credibility. It may be simply a defense mechanism.

My introspection at this point got really out of hand, and I was reminded of something that happened in a professional development session I attended some years ago. One teacher who had obviously become especially fed up with being talked at by experts like many of us finally vented his frustration by the comment "I don't see why we have to sit here listening to all of this crap. We all know that the truth about teaching is that the smart kids will learn and the stunned ones won't, so why not let's all have lunch and go home."

The disconcerting thing about this comment is that it was directed not only at professional development activities but at the whole of teaching. If there is any truth in this, then we are sitting on something that we had better not tell the government or the public just now. And lest we think that such a comment is the work of an isolated cynic, there is, as we know, a substantial body of discourse on the question "does teaching make any difference?". Our cynic could certainly have gotten some mileage out of his opinion had he chosen to write a paper on the subject.

On top of this, the evidence is, of course, overwhelming that the best single predictor of student performance is past performance and that this, in turn, is closely associated with ability and home background factors. In light of this, it is not easy to answer the cynic who argues that teachers make no difference.

Our basic question, then, is "do teachers make any difference?" or, more specifically, "do differences in classroom practices of teachers have any effect on student outcomes, over and above the effects of ability and home background?". The view that is being widely promoted these days is that we have finally learned something about effective teaching, and that the time may be ripe either to legislate minimal teaching competencies, as is being attempted in some jurisdictions, or at least to include such knowledge in preservice and continuing education programs for teachers. What, specifically, are the components of knowledge that we are supposed to have gleaned from research over the past couple of dacades, and how firm is this knowledge base? These are the questions this paper attempts to address.

DEFINITIONS, SCOPE AND LIMITS

Before going any further, it is necessary to map out the territory to be covered and set some limits, since the issue at hand is all to broad to be addressed in a single paper.

First, what is to be examined is limited to the sorts of things that happen in ordinary classrooms under everyday teaching conditions. This immediately sets two limits. Teaching which occurs under unusual conditions (such as special education classes, or even teaching in labs, gyms, music rooms, and the like) is ignored. Also, the teaching behaviours and conditions to be looked at are those which the teacher can reasonably be expected to control. Thus, we will rule out discussion of class size, materials, curriculum overall time allocations and the like as being things which, while probably important to student performance, are not within the teacher's power to influence. In other words, we are trying to avoid confusing effective teaching with effective schooling.

Second, the prescriptions to be referred to are based on evidence available from a particular genre of research, namely that based on systematic classroom observation, and particularly those studies which have attempted to find relationships between teacher behaviours and student performance. In a typical study of this sort, such as one a team at out own institute conducted a few years ago, a number of teachers are observed systematically over a fairly long period of time, and the observed classroom behaviours correlated with various

student outcome measures. Occasionally, experiments are also conducted, in which certain behaviours are manipulated and the effects of these changes measured. Finally, some studies within this genre are of the ethnographic type, in which a single teacher is observed in great detail, and attempts are made, through interviews and other means, to interpret the observed events.

In our own study, a total of 75 teachers in grades 2 and 5 were observed for about 30 hours each, over a whole school year. In all, over 2500 class periods were observed. Outcome measures included reading and mathematics achievement, as well as student self-concept, social status within the classroom, and classroom behavaviour ratings. Teacher perceptions were measured through a Q-sort instrument, questionnaires, and in-depth interviews.

Specifically, the sorts of things examined in such studies might be termed the "commonplaces" of teaching: content coverage, time use, pacing, student task engagement; whole class, group, and individual instruction; seatwork; correcting; question-response sequences; and, finally, discipline, control, and classroom management. These are the things to be looked at here, in terms of whether variations in some of these are associated with variations in student outcomes. I will not draw in any detail from any one study, since isolated results are always suspect. The points to be discussed are those on which some consensus seems to exist, at least among those who have been reviewing the area and attempting to translate research findings into teaching prescriptions. In looking for this consensus, I have drawn heavily from a number of chapters in the recently published Third Edition of the Handbook of Research on Teaching (Wittrock, 1986), which is the closest thing that exists to a definitive work in the area of research on teaching.

TIME AND PACING OF INSTRUCTION

Although total time and the basic allocations of time to subjects are not under the control of the teacher, a number of important elements of time are subject to teacher manipulation. These include proportion of time on academic tasks, pacing or speed of progress through the subject matter, student time on task, and also, to a degree, time allocation to subject, especially in elementary classrooms where timetables are frequently not rigidly followed. The teacher also controls seatwork, drill and practice exercises, and several other variables. Among the most consistent findings of classroom research is that how teachers use time is clearly related to student performance. Let us look at some specific relationships:

- Achievement is maximized when teachers emphasize academic instruction as their main goal and expect the same of students, and when teachers maximize the time allocated to academic activities rather than to activities with other aims (such as personal adjustment, student chosen activities, games, etc.).

- Not all time allocated is actually spent engaged in academic activities. Individual students may be off-task even when the class as a whole is engaged in academic work. Again, achievement is maximized when teachers arrange things to ensure that all students are engaged in academic tasks for the maximum time available. This usually requires the existence of clear rules and routines, teacher monitoring ability, appropriate level of assignments, and clear and consistent procedures by which students are accountable for work.

The above points may sound like common sense and, indeed, much of the research does reinforce the common sense wisdom of many teachers (though not necessarily the classroom practices of most). However, there are some results which seem contrary to conventional wisdom, for example:

- To learn effectively, students must be engaged in tasks which are generally of low level of difficulty. During seatwork, for example, students should be able to do most of the practice exercises. We are all familiar with the situation during a seatwork exercise in which the teacher must spend the whole time responding to requests for help. In general, when this occurs, most students are off-task, waiting to get the teacher's attention. The impression is created that the teacher is spread too thin and is being harassed. Such seatwork exercises are generally ineffective, and indicate that further whole class instruction is required or that the task is too difficult to begin with.

There is, of course, a tension between the need to proceed briskly and rapidly and the requirement that tasks not be too difficult. There is a hypothesis that teachers often judge their pacing by monitoring a so called "steering group" consisting, not of average students, as one might expect, but of students in the 10-25th percentile of ability within the class. If such students are capable of grasping what is being taught, it can be assumed that others will, as well. This has some major implications, however, for what to do with both the brightest students in a class (who are obviously being slowed down) and for those below the 10th percentile, who seem frequently to be "written off".

CLASS/GROUP/INDIVIDUAL INSTRUCTION

What we are talking about here is not the widely promoted notion of "individualized instruction". Nor are we talking about streaming or homogeneous grouping. Rather, the concern here is with the nature of the group to which the teacher's attention is directed in the classroom. In practice, the teacher usually focuses on either the whole class (during recitation, lecturing, discussion, etc.) or a single student (during seatwork, for example). However, there are circumstances in which the teacher may treat the class as several small groups (lab exercises or within-class grouping arrangements in reading are examples). The question is, what is the best focal point for the teacher or what balance among the three levels of teacher focus is appropriate?

Here the results are less clear than those for pacing and time allocations, but nevertheless show certain trends which tend to favour whole class instruction. Here, a comment on reading groups is perhaps appropriate since this is clearly the most common form of within-class grouping, and is encouraged by certain curriculum policies and structures. Our own studies have shown, first, that teachers generally oppose such grouping, on the grounds that it makes classroom life more complex. In some ways, within-class grouping of this sort resembles that bane of the teacher's existence, the multi-grade classroom. It has, in fact, always struck me as ironic that multi-grading in classsrooms is actively opposed, while within-class grouping is encouraged in many quarters within education. Teaching several groups adds to the teacher's preparation load, complicates materials selection and use, and creates a number of other practical difficulties. What I find odd about such grouping, however, is that it is almost never found outside of reading. I suspect that this is because it is only in reading that teachers are under pressure to implement such grouping practices, although the rationale for such grouping applies equally well to other subjects, especially mathematics.

Several common sense points may be made. First, when the teacher's attention is occupied within one group, there is a question of what the other groups are doing. Evidence on monitoring suggests that when the teacher is unable to monitor a particular group, the amount of off-task behaviour increases. We are all aware of the extreme example of what happens when the teacher leaves the room. It is difficult for the teacher to coordinate seatwork and other instructional tasks in such a way that the timing of task completion in a seatwork group coincide with the time the teacher can "get back" to this group. On balance, therefore, the evidence is against treating the class as several groups.

The exception to this is situations in which grouping is essential for the conduct of the activity. Again, laboratory work is one good example. Similarly, a case can be made that small groups are essential at the very early stages of reading, not for the purpose of differentiated instruction, but rather to allow students opportunities for reading aloud and the teacher a chance to diagnose reading problems.

On the question of the teacher attending to individuals, similar remarks apply. Here, however, we have the additional problem that teachers often

express the view that this sort of attention is required to ensure that the slower students receive sufficient attention to be able to keep up the pace. In our interviews, for example, teachers almost universally expressed concern for slower students and felt that they tried to give such students some "extra" individual attention. Observation data, however, tend to show the opposite. That is, it is the more able students who demand, and receive, the largest amount of teacher attention. Furthermore, if one looks at off-task behaviour, this is again more likely to occur if the teacher is paying sustained attention to one student while the others are supposed to be engaged in seatwork. The student receiving the attention may therefore benefit at everyone else's expense. On balance, therefore, it seems preferable for the teacher continually to monitor the whole class, with perhaps brief forays to examine the work of certain individuals, than to use seatwork as a vehicle for sustained "piloting" of one or two students.

QUESTIONING AND RESPONSE SELECTION

Arno Bellack and his colleagues, very early in the history of classroom observation research, found that one of the essential features of classroom teaching is what they called the solicit - respond - react cycle. The teacher solicits (questions or directs) the students respond, and the teacher assesses the response. This cycle is repeated so frequently that it can almost be termed the basic teaching act. Again, this might seem like a common sense statement, until we note that no other setting in which social discourse occurs is characterized by this kind of cycle. In a session such as this one, for example, when the presenter is finished, the audience is expected to become the questioners. In normal discourse among equals, there is a balance among questions, statements, responses, and so on across the participants. Even in other formal settings such as meetings, the rules of discourse do not encompass the solicit - respond-react cycle which characterizes teaching.

It seems ironic that in a classroom, it is the teacher, rather than the learner, who does most of the questioning. This suggests that the primary role of questioning is as an evaluative device, rather than a learning tool. This idea

is reinforced by the third act in the cycle, the "react". Student responses are almost invariably met with a teacher evaluative statement of one sort or other.

A good deal of work has been done on the question - response - react cycle. Although the results are mixed, it is fair to make the following points.

- Most questions (perhaps 75 percent) should elicit correct answers from most students. Questions that are too easy are obviously a waste of time. However, those which are too difficult for all but a few students are equally counter-productive, in that time is wasted in eliciting wrong answers, rewording the questions, giving clues, and so on.

- The research tends to refute the widely held notion that higher order questions are invariably better. Most questions asked in classrooms are, in fact, lower order ones, and there is little evidence on what happens when the proportion of higher order questions becomes quite high.

- Teachers should wait a reasonable length of time for student response. Research has shown that both participation and achievement are enhanced when teachers pause for as long as 3 seconds (instead of the average of less than one second) to give students time to respond.

- Results on selection of the respondent to a question vary with grade level and student characteristics. In the early grades, a procedure whereby each student is given equal opportunity (i.e. patterned turns) seems best. Here it is necessary to prevent the dominant students from using the response opportunities of others. At later levels, broadly based responses, in which both volunteers and non-volunteers are called upon, is desirable.

- "Call outs" represent an interesting feature of question - response sequences. Treatment of call outs has management and discipline overtones as well as being relevant to questioning. The general rule, supported by the research, seems to be to suppress call outs in

classes where most students are eager to respond or in which a few are dominant, in order to equalize response opportunities. In classes where most students are reticent, call outs can be accepted to encourage participation. The alternative to call outs is, of course, naming the student who is to respond, using either patterned turns or a random, broadly based, selection pattern as indicated above.

- When a student does respond, correctly, the response should generally be acknowledged as such but not elaborated, repeated or otherwise dwelt upon. Surprisingly perhaps, it is not important to praise the student for a correct answer. Praise tends to be overused in classrooms, and especially used in such a haphazard way so as to render it useless as a reinforcement device.

- When students give incorrect responses, the acknowledgement should be simple negation (rather than criticism, for example) and the teacher should try to elicit a correct response by rephrasing the question or giving cues. Generally, the same student should be given another opportunity to respond. However, students should not be badgered when they obviously cannot respond correctly or when they are too anxious to formulate a response.

Thus far we have ignored student questions, not because these are non-existent or unimportant, but because they are by no means a dominant feature of classroom work. Although the research has little to say on this point, what evidence there is suggests that public student questions (that is, those which are learned by the whole class), relevant to the subject at hand, should be answered directly or redirected to the class. Private relevant questions (such as those during seatwork) should usually be answered privately and not addressed to the class unless it is clear that many students are having the same problem. There is evidence to suggest that the use of student ideas should increase with grade level.

DISCIPLINE AND CLASSROOM MANAGEMENT

The final area to be examined is that of discipline and classroom management. If one can judge by public opinion polls on education, discipline is seen by many citizens as one of the major problems of schooling. On the other hand, it seems surprising to learn that classroom observation studies reveal that discipline is generally not a major issue in classrooms themselves. In part, the major problems of discipline (drugs in lockers, assaults in washrooms and the like), almost always occur outside the classroom. For example, in our studies, only about 5 percent of the time was found to be spent on matters of disruptive behaviour, and this is an overestimate because most instances of attending to discipline were more fleeting than the 30 second interval used in the observations. Classroom management, of course, goes well beyond the issue of discipline as such, and includes such things as rules, routines, time use, material use, and the like.

It is interesting to note that the idea of classroom management seems to have gone out of fashion in teacher education. I suspect that most people who have received their basic teacher education since 1970 have never had a course called classroom management, and probably have never had the issue raised in other courses. Older teachers can, of course, look back not so fondly at the old courses in this area. Such courses tended to be regarded as a bit of a joke. However, evidence now seems to suggest that a strong case can be made for re-instating courses in classroom management in teacher education programs.

Turning, then, to discipline, and more specifically to disruptive behaviour in the classroom, it might first be observed that there seems to be a tendency on the part of teachers to attribute discipline problems to the characteristics of a class. In fact, the notion of discipline problems as characteristic of a class, and not of individual students, is a fairly entrenched bit of conventional wisdom in teaching. Whatever truth there may be in this, it is equally true that different teachers will have widely different degrees of success in reducing disruptive behaviour. We therefore can legitimately ask about the teacher actions which contribute to this success.

Here, it is necessary to make reference to a specific piece of research, since the work of Jacob Kounin (1970) is the outstanding example in this area. Kounin started with the simple idea of looking at "desist incidents", or admonitions by the teacher intended to suppress certain kinds of disruptive behaviour. Such incidents are by far the most common examples of teacher action on disruptive behaviour. We are no doubt all familiar with the evocative, 1960's style set of terms Kounin devised to describe how teachers handle disruptive behaviour. The most interesting of these is the notion of "withitness". The teacher who is "withit" is the legendary figure (at least in the minds of students) with "eyes in the back of the head", who knows everything that is going on, who monitors the class continually on alert for disruptions, who avoid "target" and "timing" errors, and who deals with instances which do arise with dispatch and with a minimum of fuss. We all can perhaps recall instances in which, for example, the teacher is found in the bind of knowing that some members of a group has committed an offense but not knowing exactly who. A target error is committed, in this instance, when the teacher blames everyone for the act of one, or tries to get kids to rat on each other by threatening all with punishment. The withit teacher avoids such situations, selects his targets well, makes the punishment fit the crime, ignores minor events and concentrates on major ones, and so on.

The question is "does minimizing disruptive behaviour yield ultimate payoff in student performance?". The answer is clearly yes. Achievement is enhanced in classrooms which are relatively free of disruptive behaviour and its consequences. This, of course, is not entirely unrelated to time on task and pacing, as time on disruptive behaviour is obviously time lost to academic work.

Of course classroom management includes much more than just control of deviant behaviour. It is especially worth looking at one other aspect, namely the distinction between emotional control and control as management. The team of Robert and Ruth Soar, has conducted a number of studies (summarized in Soar and Soar, 1979). Here, the evidence seems to refute the widely accepted notion that a warm emotional climate, in which the teacher is outgoing and supportive, uses praise effusively, and attends to the emotional needs of students, is necessarily a good one. It turns out that classes which are affectively neutral are just as good, in terms of student achievement. What is to be avoided is a harsh, critical, negatively affective environment. Praise is a

particularly troublesome variable here. It seems that its effectiveness depends on the kind of classroom in which it is used. For example, praise is more effective with students of low SES and students who show a high degree of dependency. It is clear that praise tends to be overused in the classroom and, more important, is not used in the psychological sense of reinforcement. Praise tends to be scattered about somewhat indiscriminately. For example, teachers are just as likely to praise a routine answer as a really good one, and sometimes praise wrong answers, presumably just to give encouragement. Teachers also tend to praise students rather than answers, again, presumably, for motivational reasons.

Turning briefly to control as management, this involves setting limitations on movement, talk, task choice, time allocation, and similar features of the classroom setting. Here we again find clear indications that research results are at variance with conventional wisdom. Certainly, it has been widely preached in teacher education that greater "openness" in the classroom, in terms of student freedom of movement, student task choice, and the like, is desirable. Unfortunately for teacher education, the evidence on achievement suggests exactly the opposite. Achievement is maximized in classrooms characterized by a high degree of teacher control of tasks, time, movement, and the like. Unfortunately there is also some evidence that such a climate is not the best one in which to enhance certain affective outcomes. This suggests the general hypothesis that "open" classrooms may be more appropriate to achieve affective goals while "closed" classrooms are better for cognitive outcomes. While the evidence to support the hypothesis remains sparse, if this is true it presents an interesting dilemma for educators. If one kind of goal must be sacrificed to maximize attainment on other goals, which set of goals will we choose to emphasize? This question is essentially a social and political one. Research of the kind being discussed here can, at best, tell us how best to reach certain goals. It cannot tell us which goals are most important.

A final comment on management is in order. As Walter Doyle has recently argued (Doyle, 1986), classroom management is fundamentally a process of solving the problem of "orderliness" in classroom work, rather than solving problems of misbehaviour. Most of the teacher's energies go into maintaining a system of rules and routines centering primarily around boundary control and the control of discourse and work flow. Deviant behaviour is only a small part

of the picture. In fact, it is evident that increase or reduction in instances of deviant behaviour is a byproduct of the broader management system. Similarly, high or low levels of engagement flow from the management system. Given the relatively high correlations between engagement and learning and the negative ones between disruptive behaviour and learning, it is difficult to disagree with those who emphasize the importance of an appropriate and efficient classroom management system, understood and followed by bioth students and teacher.

SUMMARY AND CONCLUSIONS

To summarize, the research seems to suggest that achievement is maximized when the following classroom conditions obtain:

- High emphasis on academic instruction, with maximum time allocated to academic activities rather than activities having other goals.

- High level of student engagement in academic tasks. The trick is to maximize the engaged time for the maximum number of students. In particular, maximizing time for some students at the expense of others is counter-productive for overall achievement, whatever it might accomplish for the students who receive the additional time.

- Generally, tasks should be of low level of difficulty. This is especially true of independent seatwork, where off task time increases drastically if most students cannot do the assigned work, and there is continued pressure on the teacher to help individual students.

- In general, whole class instruction is preferred to individual or group instruction, with certain exceptions, such as oral reading in the early grades. Seatwork is somewhat overused, especially when used as a vehicle to give teachers time to attend to individual students with problems.

- Close monitoring of seatwork is required, and this precludes prolonged teacher attention to one or two student during seatwork, especially to the most demanding ones, who are not always the ones most in need of help.

- During questioning, students need to be able to answer most (perhaps 75%) of questions correctly. Teacher presentation, rather than questioning, is indicated when it is found that the teacher has to probe for answers, give many cues, and generally lose time looking for responses.

- In particular, most questions are, and probably should be, of lower order.

- Teachers should wait 3 seconds or longer for a response.

- Response selection using "patterned turns" seems better at lower grades, whereas random response patterns are preferred in higher grades. Wide participation should be sought, rather than selecting only volunteers or, especially, only dominant students. An interesting trick, when using random selection of respondents, is to wait a while before naming the student, thus forcing the whole class to anticipate being asked, and thinking about an answer, before being let off the hook by naming a student.

- As a rule, call outs should be suppressed, except where students are reticent. A clear rule is needed on this, as much time can be lost in trying to suppress call outs when students do not clearly understand that this is required. This is especially true when students are exposed to several teachers, who may have differing requirements.

- Correct responses should be acknowledged, praised if very good, but should not be elaborated or repeated.

- Incorrect responses should be negated and an attempt made to elicit a correct response. Again, however, over-dwelling on incorrect

responses, or even the occurrence of many incorrect response, is a clue that the task is too difficult.

- Classroom management should be directed towards creating conditions for the above events to occur. Obviously, disruptive behaviour should be minimized, but this may be seen as a byproduct of an orderly, task-oriented, businesslike classroom environment, with clear rules and established routines.

- Students should be given prompt feedback on homework and seatwork. Teachers should check student books, comment on work, and otherwise ensure that the work of each student is monitored. Again, efficient routines are needed to accomplish this with minimum disruption, time loss, and teacher workload.

Finally, we should point to some limitations of this analysis. First, although researchers tend to believe that their work is widely ignored by practitioners, to the detriment of teaching quality, there is one thing that is worse than being ignored, and that is being taken too seriously, too soon. The field of education is littered with supposedly research based innovations which have failed miserably in practice. Todaay's prescriptions are based on today's state of the art in research on classrooms. The major limitation of such research is that it is based largely on naturalistic, correlational research rather than experimental work. Equally important, the work is largely atheoretical, and is thus not based on, or informed by, a set of explanatory principles.

This brings us to the question of teacher evaluation. With increased emphasis on this issue, it is not surprising that administrators would grasp for any findings which would appear to provide a firm evidential base on which to evaluate teachers. In fact, there are indications that this is being taken so seriously in some places that minimum teacher performance standards, based on classroom research, are being legislated. A strong word of caution is needed here. Given the high stakes and the tentative nature of the results, it is obviously premature to use this research base for summative evaluation purposes. At the same time, its use for formative evaluation and professional development is probably warranted. What we know from the research is probably better

than what is currently being used in most teacher evaluation systems. An argument can therefore be made that evaluation schemes based on this reaserch can provide a firmer basis than, say, the opinions of supervisors after seeing one or two classes.

A further limitation of the research becomes evident when we note that relatively little observation work has been done in high schools. In some important ways, high school classrooms are somewhat different from those in elementary or even junior high schools. One of the most obvious differences is in the prevalence of teacher lecturing and student note taking, and the relative reduction in emphasis on questioning and seatwork. Furthermore, the reward system is different, especially in courses which are subject to external exams. Finally, senior high school students are essentially young adults and cannot be treated in the same way as children. It is obvious, for example, that orderliness in a high school classroom is maintained more through the good graces of the students than through the power of the teacher, as we would soon see if students suddenly decided, for example, to misbehave en masse. Such action would bear more of a resemblance to strikes or acts of civil disobedience than to ordinary school discipline problems, and would have to be resolved through negotiation rather than exercise of power.

Relatively little research has been done on the quality of lecturing or of note taking. Similarly, questioning in the high school setting has not been studied extensively. One area in which there is some evidence in on- and off-task behaviour. This evidence suggests that high school students are off-task for much greater proportions of time than elementary students, and that a good deal of the time of high school students is spent in "minimal compliance", sufficient to keep out of trouble but not sufficient to yield maximum learning potential.

Finally, the work referred to here is subject to the criticism that all we are doing is tinkering with elements of what is generally poor quality teaching and that radical changes, rather than simple attempts to fine tune the existing system, are required. The counter-argument is that, like the democratic form of government, existing teaching is probably the worst possible kind of teaching except for all the other kinds that have been invented. It is no coincidence, nor is it a mark of teacher reactionism or obstructionism, that many attempts at radical reform of teaching have failed. It may be that they really have been

found wanting in practice, whatever their theoretical merit or their value in certain restricted settings. Some very interesting research is now beginning in the area of teacher thinking and decision making, and on implementation of innovations, which I feel will eventually shed light on problems in radical reform of teaching. In the meantime, since radical reforms seem to have little chance of success, it is desirable to attempt to bring about incremental change and improvement within the existing parameters of teaching.

We may think that such incremental changes can yield only trivial results. Indeed, as we all know,the relationships between most teaching variables and student achievement are fairly small compared, say, to the relationships between IQ or home background and achievement. Most studies, of course, have been conducted over fairly short periods, so that we really have no idea of the possible cumulative effects of improved teaching. However, even the most pessimistic view would have to be that these cumulative effects are substantial. Given that the kinds of changes suggested can be brought about at virtually no cost, there is probably no better way to bring about comparable improvements. Coupled with a few other low cost changes, such as modest increases in the length of the school day and year, the potential for improvement without major additional investment is great indeed.

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